

WHAT IS CLAIMED IS:

1. A plasma processing apparatus to provide plasma processing of a substrate by plasma, said plasma processing apparatus comprising a plasma processing gas supply means, an exhaust means in a plasma process chamber, and a plasma generating means; said plasma generating means further comprises ;

a capacitatively coupled discharge means consisting of mutually isolated multiple conductors,

an electromagnetic wave radiating means to cause radio frequency displacement current to flow between said conductors and to emit electromagnetic wave, and

a magnetic field forming means;

wherein said electromagnetic wave radiating means further comprises an radiated electromagnetic wave power control means to control the radiated electromagnetic wave power through radio frequency displacement current control means forming a resonant circuit.

2. A plasma processing apparatus comprising a plasma processing gas supply means, an exhaust means in a plasma process chamber, a plasma generating means, and a means to process plasma using the generated plasma; said plasma generating means further comprises ;

a capacitatively coupled discharge means consisting of mutually isolated multiple conductors and

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an electromagnetic wave radiating means to cause radio frequency displacement current to flow between said conductors and to emit electromagnetic wave;

5 wherein said electromagnetic wave radiating means further comprising an radiated electromagnetic wave power control means to control radiated electromagnetic wave power using the radio frequency displacement current control means forming a resonant circuit.

10 3. A plasma processing apparatus according to Claim 1 or 2 further characterized by comprising a means to store the processing procedure to control distribution during plasma processing and to control plasma distribution according to the processing procedure stored in said memory means.

15 4. A plasma processing method which supplies plasma processing gas into a plasma process chamber, sets the pressure inside said plasma process chamber to the preset value, and generates plasma by capacitatively coupled discharge, emission of electromagnetic wave by radio  
20 frequency displacement current and formation of magnetic field, thereby processing a substrate;

said plasma processing method comprises steps of;  
controlling radiated electromagnetic wave power by the  
radio frequency displacement current control means forming  
25 a resonant circuit, and

processing a substrate while plasma distribution is controlled during plasma processing.

5 5. A plasma processing method which supplies plasma processing gas into a plasma process chamber, sets the pressure inside said plasma process chamber to the preset value, and generates plasma by capacitatively coupled discharge, emission of electromagnetic wave by radio frequency displacement current and formation of magnetic field, thereby processing a substrate;

10 said plasma processing method comprises steps of;  
setting displacement current frequency within the range from 10 MHz to 200 MHz,

15 controlling radiated electromagnetic wave power by the radio frequency displacement current control means forming the resonant circuit,

controlling plasma distribution during plasma processing, and

processing a substrate at the magnetic field strength within the range from from  $2 \times 10^{-4}T$  to  $10^{-2}T$ .

20 6. A plasma processing method according to Claim 4 or 5 further characterized in that plasma distribution is controlled to ensure that plasma processing of said substrate is completed uniformly for every plasma processing or during plasma processing according to uneven  
25 conditions of the substrate to be processed.

7. A plasma processing system comprising;  
a plasma processing gas supply means,  
an exhaust means in a plasma process chamber,  
a plasma generating means,  
5 a means to send RF current to a substrate to be processed,

and

a means to process plasma using the generated plasma;  
said plasma processing system characterized in that  
a RF bias circuit to send RF current to the substrate to  
10 be processed is suspended with respect to the ground.

8. A plasma processing system comprising;

a plasma processing gas supply means,  
an exhaust means in a plasma process chamber,  
a plasma generating means, and

15 a means to send RF current to a substrate to be processed,  
and

a means to process plasma using the generated plasma;  
said means to send RF current to a substrate to be  
processed further characterized in that;

20 multiple RF current conducting means are installed at  
the position opposite to the position where the substrate  
to be processed is mounted, and

said multiple RF current conducting means are provided  
with a means to control a RF current ratio by each RF current  
25 flowing from the substrate to be processed.

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